DIFFERENTIATION OF FEMALES OF CERTAIN SPECIES OF CULEX BY THE CIBARIAL ARMATURE

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The purpose of this paper is to describe characters of the cibarial (or "pharyngeal") armature of the *Culex* found in the southeastern United States. These characters support the usual subgeneric classification and serve in addition to distinguish females, previously considered indistinguishable, of certain of the species commonly placed in the subgenus *Melanoconion* (e.g., by King, Bradley, McNeel, 1942).

The cibarial armature has been used by a number of authors in separating the subgenera and certain Old World species of *Anopheles*. Christophers (1933) gives a good account of the structures involved in *Anopheles*.

The armature lies on the posterior margin of the anterior pump of alimentary canal. This pump has usually been called the pharynx, but Snodgrass (1943) has pointed out that it is in reality the cibarium. The second pump is the true pharynx. The ventral surface of the cibarium is sclerotic. This sclerotized area ends posteriorly in a broadly concave margin lying between the two cibarial cornua, which are apodemal muscle attachments at the posterior end of the cibarium. The cibarial armature, which is present only in females, consists of a series of sclerotized projections or teeth along the margin between the cornua.

With a little practice these structures can be studied about as easily as the male genitalia. The technique used is as follows: The head is placed in 10 per cent potassium hydroxide and heated for a short time. Then it is placed in water on a slide and under a binocular microscope the entire outer wall of the head is broken away in large pieces by means of fine needles. The pharynx and cibarium, attached to the hypopharynx, may now be seen within

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and are transferred, with or without separation from the other mouthparts, to a drop of chloral hydrate medium (Berlese's medium) on a slide. Here the pharynx is pulled away from the cibarium. The cibarial armature will probably still not be clearly visible because of the imbricated sclerotized teeth in the membrane of the dorsal surface of the cibarium between the cibarial cornua. Therefore, this membrane with its imbricated teeth is dissected away from the dorsal surface of the cibarium in order to expose clearly the armature on the ventral surface. This membrane should be preserved, however, since its imbricated teeth offer characters of importance. The mount is completed with a coverglass. The separation of individual teeth as recommended by Christophers (1933) for *Anopheles* has not proved to be possible with *Culex*.

The following key separates the species of *Culex* found in the southeastern United States into groups on the basis of female cibarial armatures. *Culex atratus* Theobald and *C. bahamensis* Dyar and Knab, found in this area only on the Florida Keys, have been omitted because of the lack of specimens for study.

1. Cibarial armature consisting of 25 to 35 small, slender teeth; imbricated teeth of the membrane of dorsal surface of cibarium between cornua small, lightly sclerotized, brownish 2
–. Cibarial armature consisting of 3 to 8 large, blunt teeth; imbricated teeth of membrane of dorsal surface of cibarium between cornua large, heavily sclerotic, blackish ..... (Subgenus *Melanoconion*) 3
2. Cibarial teeth not longer than width of a cibarial cornu.
(Subgenus *Culex* s. str.) *pipiens* Linnæus, *quinquefasciatus* Say, *tarsalis* Coquillett, *salinarius* Coquillett, *nigripalpus* Theobald
–. Cibarial teeth much longer than width of a cibarial cornu.
(Subgenus *Neoculex*) *apicalis* Adams
3. Cibarium with three teeth ..... *pilosus* (Dyar and Knab)
–. Cibarium with seven or eight teeth.
erraticus Dyar and Knab, *peccator* Dyar and Knab

These characters are shown in greater detail in the figures. Except to strengthen the recognized subgeneric classification, the cibarial characters contribute little to our knowledge of the subgenera *Culex* s. str. and *Neoculex*.

The three remaining species, however, are externally indistinguishable in the females except that most specimens of *errati-*

cus have some coarse, golden, mesoscutal scales and the broad, appressed, occipital scales are limited to a band along the eye margin, while in the other two species the mesoscutal scales are usually dark and the occiput is usually mostly covered with broad, appressed scales. These characters do not hold for every specimen. The cibarial characters thus make possible the identification of female *pilosus*.

It is interesting to note that Edwards (1932), on the basis of larval characters, placed *pilosus* in the subgenus *Mochlostryax*,

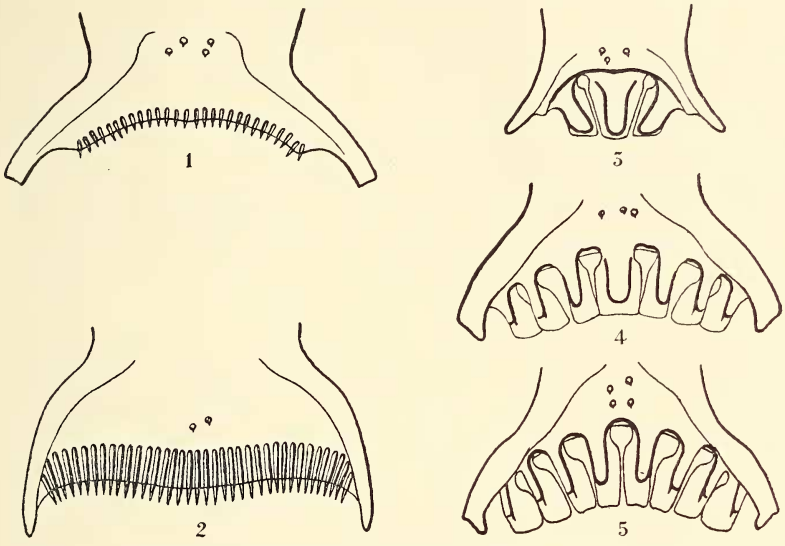

Fig. 1. Cibarial armatures of: 1, *Culex* (*Culex*) *restuans;* 2, *Culex* (*Neoculex*) *apicalis* Adams; 3, *Culex* (*Melanoconion*) *pilosus* (Dyar and Knab); 4 and 5, *Culex* (*Melanoconion*) *erraticus* Dyar and Knab.

and *erraticus* and *peccator* in *Melanoconion*. The cibarial armatures of the three species here discussed support this classification, but until these characters have been studied for the numerous tropical species of this group, it is not advisable to consider the cibarial armature as a subgeneric character.

The cibarial armatures of about twenty specimens of *C. pilosus* have been examined and found quite uniform in structure. Several of those studied were from a series reared from *pilosus* larvæ by Mr. Wm. V. Reed. The armatures of forty other female

specimens of *Melanoconion* were examined. All were seven- or eight-toothed. Most of them, on the basis of the characters of the vestiture already mentioned, were presumed to be *C. erraticus* and two were from a series reared from *erraticus* larvæ by Lt. Basil G. Markos. Among the six specimens studied having seven or eight cibarial teeth but vestiture as in *pilosus* and *peccator,* two from different localities were collected with males of *peccator* and are, no doubt, females of that species. Both of these had but seven teeth.

LITERATURE CITED

CHRISTOPHERS, S. R. 1933. The fauna of British India, Diptera, Vol. IV, Family Culicidæ, Tribe Anophelini, vi + 371 pp., illus.

EDWARDS, F. W. 1932. Diptera, Fam. Culicidæ, in Wytsmann's Genera Insectorum, fasc. 194, 258 pp., illus.

KING, W. V., G. H. BRADLEY, AND T. E. MCNEEL. 1942. The mosquitoes of the southeastern states, U. S. Dept. Agr., Misc. Publ. 336, 96 pp., illus.

SNODGRASS, R. E. 1943. The feeding apparatus of biting and disease carrying flies: a wartime contribution to medical entomology, Smithsonian Misc. Colls., vol. 104, no. 1, pp. 1–51, illus.